

**DEPARTMENT OF AGRICULTURE,
CEYLON.**

BULLETIN No. 39.

**THE DISTRIBUTION OF
XYLEBORUS FORNICATUS, Eich.**

(*Shot-hole Borer of Tea.*)

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Peradeniya,

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XYLEBORUS FORNICATUS, Eich.

(*Shot-hole Borer of Tea.*)

1.—HISTORY IN CEYLON.



THE description of the Shot-hole Borer Beetle (*Xyleborus fornicatus*) was made by Eichhoff* in 1868 from a specimen collected in Ceylon. Though not impossible, it is yet improbable that Eichhoff's specimens were found attacking the tea bush.

Though tea existed in the Island at the time, the range of the plant was confined to a few examples in the Botanic Gardens and some acres newly planted on the Loolecondéra estate (Lower Hewaheta district). From correspondence between Mr. E. E. Green and Mr. G. Alston, it is quite certain that the insect was present on the Craighead estate, Nawalapitiya (Dolosbage district), in 1892. Specimens were sent by Mr. Alston to Dr. Trimen in 1893, and on January 23 of that year Dr. Trimen answered as follows :—

They are well-known little beggars, closely allied to the apple twig borer at home (i.e., *Xyleborus dispar*). I do not think his work leads to any very great damage in the tea plants, but if he came in great numbers he might do considerable harm. I know this little borer on four estates near here (Peradeniya) myself : in one case he disappeared to a large extent ; in the other cases he is spreading, but as yet has done no very serious damage.

From a later letter from Mr. Alston the pest was first noticed in January, 1892, Field 28 A, but it was evidently on the estate before that time.

In April, 1896, the following article by Mr. Edward Barlow appeared in Indian Museum Notes, Vol. IV., No. 2, pp. 56–58, with a drawing of the insect (pl. V., fig. 2), containing an extract of Mr. Alston's letter to Mr. Green dated January 8, 1895 :—

On January 28, 1895, specimens of a small beetle, together with pieces of tea stems riddled by them, were sent to the Indian Museum through Mr. E. E. Green, of Ceylon, from Mr. G. Alston, superintendent of tea estate, Craighead, Nawalapitiya. The insect proved on examination to belong to a species of Scolytid beetle, which has not previously been reported to attack tea plants in India. Specimens

* Berl. Ent. Zeitschr., p. 151, 1868.

were therefore forwarded to Mr. W. F. H. Blandford, who very kindly examined them and identified them as belonging to the species *Xyleborus fornicatus*, Eichhoff, a form closely allied to the often destructive species *Xyleborus dispar* of Europe and North America.

The following is an extract from a letter furnished by Mr. G. Alston:—

The pest appears mostly in patches, but has spread very considerably since I first observed it in any number three years ago. There is no evidence of any previous disease in attacked trees. Most of the trees attacked show no outward sign of the pest, except when almost every branch is attacked, when they turn rather yellow, and stop flushing. Young trees about two years old, before they are topped, often snap off at the spot where the borers have made holes for their entrance or exit. Strong vigorous trees in good soil seem to be very little affected by it, and throw out good red wood even from badly bored stems. On the other hand, poor plants on ridges or poor soil seem naturally to feel the effect of it quickly, though in no case have I seen a tree killed by it. Isolated branches die off, but new branches come out in their places. As a rule, you can only tell an attacked tree (except in the case of young plants, when the stems snap off) on pruning it, when the holes in the wood are very apparent. It (the beetle) does not attack the cut surface after pruning, but makes its entrance through the bark. In the case of young red wood, it very generally goes straight down the pith; in older branches I have often seen the wood riddled, as if a charge of snipe-shot had been fired into it, with only one or two minute holes in the bush for exit or entrance. And yet, in the case of vigorous trees, they seem to thrive notwithstanding. Since 1893 the pest has spread very much and become more general, though I cannot say that I see much difference in the fields that were attacked then.

The writer, in the foregoing account of the pest, practically suggests the remedy, namely, either not to plant in poor soil, or, if the soil is poor, to improve it, and then to strengthen the plant against attack, the great object of all medical treatment everywhere.

To prevent the spread of the disease, the affected branches should be cut off and burnt.

The next record of the pest comes from Attabagie estate, Gampola (Pussellawa district), in 1899, and further records are as follows:—

Estate.	Post Town.	District.
1900.		
Pon-y-lan	.. Dolosbage	.. Dolosbage
1901.		
Augusta	.. Peradeniya	.. Hantane
Hindugalla	.. do.	
Deltota	.. Deltota	
1903.		
Kadawella	.. Watawala	.. Lower Dikoya
Deaculla	.. Koslanda	.. Haputale
Poongalla	.. do.	.. do.
Tonscombe	.. Namunukula	.. Badulla
Hauteville	.. Agrapatana	.. Dimbula
Halgolle	.. Yatiyantota	.. Kelani Valley
Kotuwagedera	} Matale	
Midlands		
Ury	.. Passara	.. Passara
		Knuckles and Kelebokka

This gives evidence that in 1903 the insect was already distributed in a number of widely separated districts, and by 1909 estates in Maturata and Wattegama were added. Since 1912, when the Rangala and Medamahanuwara districts were reported, the range has extended to Balangoda, Ratnapura, Galle, Kalutara, Madulsima, Kegalla, and a few estates in Upper Dikoya.

The record in 1903 from Hauteville, Agrapatana, is of especial interest, as the estate lies in the middle of a large uninfected area. There can be no question of the identity of the specimens, which are still in the Department of Agriculture.

Inquiries show that Shot-hole Borer was found attacking about half an acre of tea on the Glasgow boundary in August, 1903; the infected portion was pruned, and all the prunings were burnt; this information comes from Mr. Jackson, who was then a superintendent on the estate. The borer has not reappeared here or on any neighbouring estate in the Dimbula district.

Quite recently there has been a considerable spread in the Ratnapura and Balangoda districts, both of which may now be taken generally as completely infected, except for some outlying and isolated estates. Here the infection undoubtedly started from the planting of infected tea plants brought from the Ambegamuwa and Lower Hewaheta districts in 1910 on a new clearing of 47 acres. Since 1914 the borer has covered an approximate area of 5,000 acres in the district.

It is a great mistake to suppose that all areas where tea is grown in Ceylon are affected by Shot-hole Borer. Haputale West, New Galway, Nuwara Eliya, and Uda Pussellawa, where the borer is entirely absent, represent an area of 15,000 acres alone; while in Upper Dikoya, Dimbula, Madulsima, and Maskeliya about 90,000 acres are still uninfected. The total area uninfected is about one quarter of the total acreage under tea.

The list of infected estates at the end of this Bulletin serves to give a good general idea of the distribution of the pest. The most interesting point is the limitation of the distribution at certain places in well-marked valleys. In Dimbula the infestation comes to a somewhat abrupt end on the East Holyrood and St. Andrew's estates, and it seems likely that the insect is from time to time blown from the lower portion of the valley (Maddocombra) to the latter estate, but never becomes properly established there. Similar instances are afforded in the cases of the Rozelle-Hatton valley (Lower Dikoya), and the lower elevations of Upper Dikoya and Maskeliya. The Maha Uva estate lies between the Walapane and Uda Pussellawa districts, and the lower portion has been

somewhat heavily infected since 1915. Being isolated from the large uninfected Uda Pussellawa district by jungle and patana, an opening of the intervening land might be a menace to the latter district.

There can be little doubt that wind and the planting of new clearings with infected tea plants have been in great part the factors in the distribution of the insect.

Distribution by natural causes appears to spread the insect much less rapidly than distribution in infected plants.

2.—DISTRIBUTION IN CASTOR OIL TREE.

Mr. E. E. Green collected Shot-hole Borer in castor oil tree (*Ricinus communis*) from Hanguranketa in July, 1906, and the late Mr. A. Rutherford recorded it in this plant from Peradeniya in 1914. Until 1915 it was not realized to what a large extent the tree was attacked, and it may now be said that, in the red variety of the plant, the insect has been found from sea level to an elevation of 6,000 feet. The habit of the insect, when boring in this tree, gives evidence that castor oil tree is the true host plant; and this is further corroborated by the distribution outside Ceylon, and by the fact that the tree is infested in Ceylon in areas very far removed from any tea. There is some reason for believing that the tea on one or two estates has been infected directly from this plant, and the case of the Hauteville estate, mentioned above, possibly throws light upon the matter, as castor oil trees have long been in the Dimbula district, and, before their removal, were breeding many millions of insects.

3.—DISTRIBUTION OUTSIDE CEYLON.

In August, 1917, specimens of castor oil tree were received from Bangalore, India (elevation 3,000 feet), riddled by true Shot-hole Borer. These were collected and sent by the Government Entomologist, Coimbatore; there were some hundreds of insects in the sections of the tree received. This is the only authentic record of the insect outside Ceylon.

Inquiry has been made into several other records, and in each case it will be seen that there is grave doubt of the identity of the insect:—

Watt and Mann, "The Pests and Blights of the Tea Plant," p. 175, 1903:—

Xyleborus fornicatus, Eichhoff.—Till the autumn of 1900 it (the beetle) was unknown in India, but then suddenly appeared and did considerable damage on a garden in the Upper Dibrugarh district before its nature was discovered and measures were taken to deal with it. One of the authors has since found it in a second place in Upper Assam, again doing considerable damage.

Description and Depredations.—The insect is a small beetle, rarely more than one-eighth of an inch in length, which is found riddling the branches and stems of the bushes, both as a grub and in the mature condition. The extremely small size of the beetle often prevents its recognition, until a very large patch of the tree has been attacked and seriously affected.

When first reported in India, the manager of the estate on which it occurred described the plot affected as a piece of pure Assam indigenous tea, and then went on to say, "the affected part looked at first as if it had been struck by lightning, a number of bushes turning red and then dying off completely. No notice was taken of it until it was seen to be spreading, when, on close examination, powdered wood was noticed round the affected bushes, and small holes in the stem a few inches above the ground. On the stems being split open, a number of beetles and grubs were found to be inside, and to have tunnelled the stem in all directions, but only for about 6 inches in height, and in every case just above the ground."

It will be seen that the description here given is entirely different from that correctly recorded in the Indian Museum Notes of 1896. Therefore, it must be assumed that the insect here described belongs to another species. *Xyleborus semipacus*, Eich., and *Xyleborus perforans*, Woll., have both been recorded from tea in Ceylon, but from bushes previously killed by some fungus disease. The description given by Watt and Mann strongly points to the bushes having first been killed by some agency other than an insect. In a letter dated January 22, 1917, Dr. Mann says:—

The samples of *Xyleborus forniciatus* which I reported in "Pests and Blights of the Tea Plant" were identified by Dr. George Watt from samples sent to him by Mr. Green from Ceylon. They came from the Pobbaian Tea Co., and the whole patch where they occurred was at once burnt and cut down to the ground. They were never found again in my time, either there or anywhere else. The samples, if they still exist, are with the rest of Sir George Watt's collection of tea pests and blights. Where these were sent to I do not know. They may be with the Imperial Entomologist, Pusa.

Further inquiries show that the specimens were preserved on slides in the Indian Museum, but had become detached and lost.

With regard to the second place in Assam from which the insect was recorded, there appears to be no record whatever.

It can only be assumed that there was here some mistake in identity, and the specimens, though compared with samples from Ceylon, were never determined by any authority on Scolytid beetles. The record is copied in Lessroy's "Indian Insect Life," p. 395. Specimens received from Assam in tea were all species different from *X. forniciatus*, but species which might be confused with that insect.

Bainbridge Fletcher, "Some South Indian Insects," 1914, pp. 345-346 :—

Xyleborus forniciatus, Eich.

Distribution : Travancore (Pirmad and High Range).

Status : The Shot-hole Borer is said not to be uncommon in Travancore, and presumably does little damage.

Remarks : I am indebted to Mr. Anstead for information regarding the occurrence of this insect in Southern India.

The record was made on the authority of Mr. R. Anstead, Deputy Director of Agriculture, Bangalore.

In a letter dated August 30, 1917, he says :—

I think it is extremely probable that *X. forniciatus* does not occur in South India. I have a note that I found what I then thought to be this insect in 1910 in Peermade, and am responsible, I know, for telling you this (in a previous letter); but in view of what I now know of this insect, and that I cannot find it again or hear of it from any tea planter, I think I made a mistake, and mistook some other pest for *Xyleborus*. At any rate, if it does occur, it is very rare, and not a pest.

M. Hagedorn, "Der Tropenfanzler," Berlin, XVII., No. 4, April, 1913, p. 215 :—

Two Scolytid beetles have been destructive to nutmeg (*Myristica fragrans*) in Penang, *Xyleborus forniciatus*, Eichoff.

Hagedorn, the Scolytid authority, gives the record, and refers to specimens from cacao in Ceylon in No. 3 (March, 1913, p. 154) of the same journal. Here, however, though stating that the insect is found in cacao and tea in Ceylon, he does not refer to the Penang record in the later number. Of the many trees and plants attacked by *X. forniciatus* in Ceylon, the nutmeg does not appear amongst them, though another species of Scolytid is common in the fruits (Coccotrupes).

E. A. Andrews, "Quarterly Journal, Scientific Department, Indian Tea Association," Part IV., 1913, pp. 94 and 95.

Under the heading *Shot-hole Borer*, *Xyleborus forniciatus*, a description of the habits is given, which, if applying to the species, is so inaccurate that it is certainly not worth quoting.

The locality in which the observations were made is not given, and the remedial measures, "by placing upright poles in the ground among the bushes, the insects may be induced to leave the latter alone and bore into the former, which can be destroyed," have obviously been suggested by one who has no knowledge whatever of the insect.

The Entomologist at the Tocklai Experiment Station, Assam, amongst other valuable information, says that "Antram recorded *X. forniciatus* from Romari tea estate,

Assam, but when I was there in 1915 I found that the damage which he had attributed to a Scolytid was caused by a small Psychid (Lepidopterous) caterpillar."

In conclusion, it may be said that, owing to the knowledge of the true Shot-hole Borer as a pest in Ceylon, authorities in India have recorded this insect in that country on the slenderest ground, and the fact that no specimens of *X. forniciatus* are available from India for identification, except in the one authentic case from Bangalore in castor oil tree, gives legitimate cause for assuming that the insect does not exist in tea either in India or Assam.

It is possible that Hagedorn's record from Penang in nutmeg is valid, but no details of any kind are available.

According to the "Review of Applied Entomology," Vol. IV., p. 136, Mr. C. F. C. Beeson, in the "Indian Forester, Allahabad," XLII., No. 4, April, 1916, pp. 216-223, records *X. forniciatus* from the sal tree (*Shorea robusta*), but the Forest Zoologist, Dehra Dun, writes on September 4, 1917, "I have seen no specimens of *X. forniciatus* from India."

The distribution of *Xyleborus forniciatus*, Eich., is as follows:—

Plant.	Elevation. Feet.
<i>India (Bangalore).</i>	
<i>Ricinus communis</i> L. Castor Oil Tree ..	3,000
<i>Penang.</i>	
<i>Myristica fragrans</i> Houtt. Nutmeg ..	?
<i>Ceylon.</i>	
<i>Albizia moluccana</i> Mig. ..	100-3,000
<i>Allophylus cobbe</i> ..	1,600
<i>Bixa orellana</i> L. Annatto ..	?
<i>Camellia theae</i> Link. Tea ..	100-5,000
<i>Caryota urens</i> L. Kitul Palm ..	4,000
<i>Cassia siata</i> L. ..	1,600
<i>Cinchona calisaya</i> Wild. Cinchona ..	?
<i>Citrus aurantium</i> L. Orange ..	2,000
<i>Clerodendron</i> sp. ..	1,600
<i>Crotalaria striata</i> ..	2,000
<i>Desmodium cephalotes</i> ..	1,600
<i>Erythrina lithosperma</i> Bl. Dadap ..	1,600-4,500
<i>Grevillea robusta</i> A. Cunn. Silky Oak ..	1,600-4,000
<i>Hevea brasiliensis</i> Mull. Para Rubber ..	1,000-2,000
Jungle Shrubs and Lantana ..	1,000-4,000
<i>Melastoma malabathricum</i> L. ..	1,000
<i>Persia gratissima</i> Gaertn. Avocado Pear ..	1,600
<i>Pithecellobium volubile</i> Jacq. ..	1,600
<i>Photinia japonica</i> Lindl. Loquat ..	3,000
<i>Psidium guyava</i> . Guava ..	?
<i>Ricinus communis</i> L. Castor Oil Tree ..	100-6,000
<i>Tephrosia candida</i> D. C. Boga Medalloa ..	1,000-4,000
<i>Tephrosia vogelii</i> ..	1,600
<i>Terminalia catappa</i> L. Country Almond ..	1,600
<i>Theobroma cacao</i> L. Cocoa ..	1,600

Of these plants, only three harbour the insect to any great extent, namely, castor oil tree, tea, and country almond, if the identification is correct in the latter case.

Species of *Crotalaria*, *Tephrosia*, the *Dadap*, and *Albizia* may occasionally be seriously attacked. In the other plants galleries are only made with varying success. In the case of the country almond, portions of wood attacked by fungus, but otherwise living, have been infested; in all other cases living tissue is entered. Jungle shrubs are only entered in close proximity with heavily infected tea.

4.—ELEVATION.

The elevation of the Craighead estate is about 2,000 feet above sea level. It is at this elevation that Shot-hole Borer is now particularly abundant. In 1903 the insect was certainly established at elevations of about 4,000 feet. There does not seem to be much doubt that Shot-hole Borer spreads gradually upwards, attaining an altitude of 5,000 feet, but it becomes less common when 4,000 feet is reached, and above 4,500 it is no longer a serious pest.

The intervals at which tea is pruned certainly influence the infestation at given altitudes, and if tea can be run so that a vigorous flush can be plucked for longer periods, the infestation is less than that at a similar altitude, where the tea flushes for shorter periods, entailing shorter periods between prunings.

The reason for the borer being less common at elevations above 4,000 feet is that the development is longer by a period of some three weeks, as compared with that at 2,000 feet or under. At very low elevations, 100–1,000 feet, the insect, curiously enough, becomes again less abundant. The districts of Galle and Kalutara, which afford examples, are, however, extremely wet, and this may in part account for the marked falling off in the infestation.

List of Estates Infected (to June 7, 1918).

District.	Name of Estate or Division.	Name of Estates Infested (to June 7, 1918).	Group.	Post Town.	Date of Registration.
Alegala (see Kadugannawa North).					
Ambagamuwa	Arslana				
	Ashbourne				
	Atheron (see Kotmale district).				
Blackwater	..	Midland	..	Nawalpitiya .. do.	June 28, 1917 .. February 5, 1916
Bridgend	..	—	..	Nawalpitiya .. do.	March 19, 1916 .. February 5, 1915
Dahanwala	..	Penrhos	..	Gallebedde .. Galboda .. Clefem	February 5, 1916 .. September 16, 1916 .. do. .. do.
Ellawala	..	—	..	do. .. do. .. do.	do. .. do. .. do.
Gallebedde	..	Gallebedde	..	do. .. do. .. do.	do. .. do. .. do.
Glenfern	..	Clefem	..	do. .. do. .. do.	do. .. do. .. do.
Gneiss Rock	..	Midland	..	do. .. do. .. do.	do. .. do. .. do.
Green Hayes	..	—	..	do. .. do. .. do.	do. .. do. .. do.
Hangeranoya	..	Penrhos	..	do. .. do. .. do.	do. .. do. .. do.
Hendy's	..	—	..	do. .. do. .. do.	do. .. do. .. do.
Hyndford	..	Hyndford	..	do. .. do. .. do.	do. .. do. .. do.
Inboopitiya	..	—	..	do. .. do. .. do.	do. .. do. .. do.
Katuwatta	..	Midland	..	Galboda .. do.	January 12, 1917 .. March 19, 1915
Kenilworth	..	Gallebedde	..	do. .. do.	do. .. do.
Mastrawatte	..	—	..	do. .. do.	do. .. do.
Midland	..	Penrhos	..	do. .. do.	do. .. do.
Pearlous	..	Midland	..	do. .. do.	do. .. do.
Prestonland	..	Rondra (see Keleri Valley).	..	do. .. do.	do. .. do.
		St. Olive (see Yakkassa).	..	do. .. do.	do. .. do.
		Strathellie	..	do. .. do.	do. .. do.
		Wavellakellewa	..	do. .. do.	do. .. do.

District.	Name of Estate or Division.	Group.	Post Town.	Date of Registration.	Gazette No.
Badulla	Angodde	Cobo	Badulla	May 14, 1915	6,713
	Athampettiya	"	"	June 7, 1918	6,948
	Ballagalla	Glen Alpin	Badulla	May 14, 1915	6,713
	Cobo	Cobo	do.	do.	do.
	Craigmore	"	Hadiela	March 9, 1917	6,868
	Cullen	"	Badulla	May 14, 1915	6,713
	Debedde	"	do.	June 7, 1918	6,948
	Devavatura	Tonacombé	Namunukula	July 30, 1915	6,730
	Dickewella	"	Badulla	June 7, 1918	6,948
	Dohlands	Sarnia	Demodera	May 14, 1915	6,713
	Ehawattie	"	Badulla	June 7, 1918	6,948
	Elmhurst	"	Namunukula	do.	do.
	Fernmoyle	Tonacombé	"	February 2, 1917	6,851
	Galpitakanda	Glen Alpin	Badulla	May 14, 1915	6,713
	Glen Alpin	"	Demodera	February 5, 1915	6,697
	Gowenkalle	"	Namunukula	May 14, 1915	6,713
	Hindagalla	"	Badulla	March 19, 1915	6,705
	Hingurugama	"	Halela	December 11, 1914	6,687
	Jainudeen	"	Namunukula	June 7, 1918	6,948
	Kalugalla	"	do.	July 30, 1915	6,730
	Kaudahena	Keenakelle	Badulla	October 12, 1917	6,902
	Keenakelle	Spring Valley	do.	March 19, 1915	6,705
	Koitagondde	"	do.	June 7, 1918	6,948
	Mahapahagalla (see Passara).	Sernia	do.	June 1, 1917	6,876
	Mahatenne	"	do.	March 19, 1915	6,705
	Moragalla	"	Demodera	August 3, 1917	6,890
	Nihavilla	"	do.	May 14, 1915	6,713
	Napier	"	Badulla	December 17, 1915	6,764
	Nerangalla	Demodera	Demodera		
	Nanilla				

	Balangoda		
Oeumbo	.. Domodora ..	Domodora ..	May 14, 1915 .. 6,713
Oodowero	.. do.	do.	do.
Pingarawwa	.. Nanunukula ..	Nanunukula ..	May 14, 1915 .. 6,713
Ravenstown	.. Bedulla ..	Bedulla ..	September 10, 1915 .. 6,739
Rockhill	.. Nanunukula ..	Nanunukula ..	May 14, 1915 .. 6,713
Sarnia	.. Badulla ..	Badulla ..	do.
Serendib	.. Sarnia ..	do.	June 7, 1918 .. 6,948
Southam	.. Domodora ..	Domodora ..	September 15, 1916 .. 6,823
Spring Valley, I.-V.	.. Spring Valley ..	Bedulla ..	February 5, 1915 .. 6,697
St. James	..	Hatella ..	March 19, 1915 .. 6,705
Stretchenden	..	Domodora ..	May 14, 1915 .. 6,713
Telbedde	..	Bedulla ..	February 22, 1918 .. 6,926
Tonscombe	.. Tonscombe ..	Nanunukula ..	March 19, 1915 .. 6,705
Ungalla	..	Badulla ..	June 7, 1918 .. 6,948
Westmorland	..	do.	June 1, 1917 .. 6,876
Wewesse	..	do.	March 19, 1915 .. 6,705
Weyrehenna	.. Domodora ..	Domodora ..	May 14, 1915 .. 6,713
Yelerton	..	Badulla ..	do.
		do.	June 7, 1918 .. 6,948
Alupolla (see Ratnapura district).			
Cecilton	.. Balangoda ..	Balangoda ..	June 7, 1918 .. 6,948
Donegama	.. Bogavantala ..	Bogavantala ..	September 15, 1916 .. 6,823
Dentagalla	.. Balangoda ..	Balangoda ..	July 30, 1915 .. 6,730
Kearagaha-Ella	..	do.	June 18, 1915 .. 6,722
Kappoch	..	do.	March 9, 1917 .. 6,853
Maranvuno	..	do.	June 7, 1918 .. 6,948
Meddakandie	.. Meddakandie ..	do.	do.
Pambazolla	.. Balangoda ..	do.	July 30, 1915 .. 6,730
Pinnawela	.. do.	do.	June 7, 1918 .. 6,948
Rissigalla	..	do.	June 29, 1917 .. 6,884
Wallawe	..	do.	July 20, 1917 .. 6,883
Weyrehenna (see Ratnapura district).			

District.	Name of Estate or Division.	Group.	Post Town.	Date of Registration.	Gazette No.
Dikoya (Upper)	Glengariff	—	Haston	February 5, 1915 ..	6,697
	Oxborne	—	do.	March 19, 1915 ..	6,705
Dikoya (Lower)	Aberdeen	—	Watawala	September 10, 1915 ..	6,739
	Abergeldie	—	Roeelle	October 22, 1915 ..	6,749
	Agrawatta	Carolina	Watawala	February 5, 1916 ..	6,897
	Carolina, No. 1	do.	Watawala	do.	do.
	Do. No. 2	do.	do.	do.	do.
	Connar	Cornar	do.	September 15, 1916 ..	6,893
	Doonybrook	—	Haston	February 5, 1915 ..	6,697
	Hardenish	—	Watawala	do.	do.
	Kadawella	Carolina	do.	do.	do.
	Lonach	—	Haston	do.	do.
	Norton	—	Watawala	do.	do.
	St. Aubins	—	do.	November 16, 1917 ..	6,909
	St. Heliers	—	Haston	February 5, 1915 ..	6,697
	Velai Ora	—	do.	do.	do.
	Watawala	—	Talavakelo	August 31, 1917 ..	6,815
	Devon	—	do.	October 22, 1915 ..	6,749
	East Holyrood	—	Watagoda	February 5, 1915 ..	6,697
	Meddecombe	—	Koragala	do.	do.
	Mount Vernon	—	Talavakelo	June 7, 1918 ..	6,948
	St. Andrews	—	Watagoda	September 10, 1915 ..	6,739
	Yorford	—	Dolosbage	February 5, 1915 ..	6,697
	Allegalla	Barnegalla	do.	do.	do.
	Barnegalla	do.	Ingorugalla	January 12, 1917 ..	6,847
	Berewellia	—	Garopola	February 6, 1916 ..	6,697
	Boosward	—	Dolosbage	do.	do.
	Castaren	—	Navarupitiya	do.	do.
	Chilankandie	—			

Cecorondoowattu	..	..	Gampola	May 14, 1915	..	6,713
Craighead	..	..	Navalapitiya	February 6, 1916	..	6,697
Dallengles	..	..	Dolosbage	do.	..	do.
Dambalgoda	..	..	Undugoda	do.	..	do.
Dedgewella	..	..	Dolosbage	do.	..	do.
Denmark (see Pusselewa district).	..	..	Tamarawelli	do.	..	..
Epplewatta	..	..	Tamarawelli	..	January 12, 1917	..
Gallemedenna	..	..	..	do.	February 6, 1916	..
Gangvariy	..	..	..	do.	..	6,697
Gonavatia	..	..	..	do.	..	do.
Hapugahawatta	..	..	Tamarawelli	..	January 12, 1917	..
Havilland	..	..	..	do.	..	..
Hillside	..	..	..	do.	..	..
Ingringalla	..	..	Gampola	..	May 14, 1915	..
Jack Tree Hill	..	..	Dolosbage	..	February 6, 1916	..
Kellie	..	..	..	do.	..	6,697
Kelepin	..	..	..	do.	..	do.
Lamern Hill (see Kadugannawa district).	..	..	..	do.	..	do.
Masketoya	..	..	..	do.	..	..
Meddegoda	..	..	Udahentenna	..	January 12, 1917	..
Menangalla	..	..	Dolosbage	..	February 5, 1915	..
Monte Cristo	..	..	..	do.	..	6,697
Messville	..	..	..	do.	..	do.
Narakande	..	..	Mossville	..	..	..
Onankande	..	..	Tamarawelli	..	January 12, 1917	..
Parracalla	..	..	..	do.	..	6,697
Pen-y-lan	..	..	..	do.	..	do.
Raxava	..	..	..	do.	..	..
St. Catherine	..	..	..	do.	..	..
St. Helens	..	..	..	do.	..	..
Somersett	..	..	..	do.	..	..
Tamarawelli	..	..	..	do.	..	..
Theydon Bois	..	..	..	do.	..	..
			Tamarawelli	..	January 12, 1917	..
			..	do.	..	6,847
			..	do.	..	6,705
			..	do.	..	..

District.		Name of Estate or Division.	Group.	Post Town.	Date of Registration.	Gazette No.
Doloshaige —contd.	..	Ugisesido Wenelle	..	Urdugoda	March 19, 1915	6,705
	..	Wewikelle	..	Aranayaka	do.	do.
	..	Windsor Forest	..	Doloshaige	January 12, 1917	6,847
	..	Yellancowry	..	Aranayaka	February 5, 1915	6,897
Dumbara	..	Rajawella	..	Kandy	do.	do.
Galagedara ..	..	Bolagolla, (Upper) Moragamande	..	Kandy	do.	6,897
	..	Pallekelle	..	Kandy	do.	do.
	..	Tamarawelly	..	Kandy	do.	do.
Galle	..	Pallegalle	..	Kandy	do.	do.
	..	Yahalatenne	..	Kandy	do.	do.
	..	Beau Sejour	..	Kandy	do.	do.
	..	Gahinda	..	Kandy	do.	do.
	..	Pati Rajah	..	Kandy	do.	do.
	..	Talgesswella	..	Kandy	do.	do.
	..	Amblamana	..	Kandy	do.	do.
Hantane	..	Aniswattie	..	Kandy	do.	do.
	..	Augusia	..	Kandy	do.	do.
	..	Dinally	..	Kandy	do.	do.
	..	Galah	..	Kandy	do.	do.
	..	Hantane	..	Kandy	do.	do.
	..	Hindugalla	..	Kandy	do.	do.
	..	Hopewell	..	Kandy	do.	do.
	..	Inrogalla	..	Kandy	do.	do.
	..	Kitoolmoola	..	Kandy	do.	do.
	..	Mewatura	..	Kandy	do.	do.
	..	Mount Pleasant	..	Kandy	do.	do.
	..	Mount Plesant	..	Kandy	do.	do.
	..	Ocotovella	..	Kandy	January 12, 1917	6,847
	..	Orongalla	..	Kandy	do.	do.

	<i>Rapatale</i>	
Peraideniya (New)	..	Peradeniya .. February 5, 1915 .. 6,897
Peraideniya (Old)	..	do .. do ..
Primrose Hill	..	Kandy .. August 3, 1917 .. 6,880
Prospect Hill	..	Peradeniya .. September 10, 1915 .. 6,739
Rosswaita	..	Kandy .. February 5, 1915 .. 6,897
Rosshill (Training Colony)	..	Peradeniya .. do .. do ..
Vedacheta North	..	Dunlavy .. Galaha .. December 28, 1917 .. 6,917
Ampittikene	..	Koelanda .. June 7, 1918 .. 6,948
Ampittikande	..	Bandarawela .. do ..
Arivali	..	Haputale .. August 3, 1915 .. 6,897
Balkallala Ella	..	do .. August 3, 1917 .. 6,880
Batgodde	..	Haputale .. February 5, 1915 .. 6,897
Berragolle	..	do .. March 19, 1915 .. 6,705
Blackwood	..	do .. February 5, 1915 .. 6,897
Broughton	..	Bandarawela .. June 7, 1918 .. 6,948
Cabragalla	..	do .. February 5, 1915 .. 6,897
Cattion	..	do .. do .. do ..
Deaculla	..	Koslanda .. May 14, 1916 .. 6,713
Dickapititia	..	Haputale .. February 5, 1915 .. 6,897
Diyalumma	..	Bandarawela .. do .. do ..
Feliside	..	do .. Haputale .. May 14, 1915 .. 6,713
Goleonda	..	Haldummulla .. February 2, 1917 .. 6,861
Haldummulla	..	do .. Haldummulla .. May 14, 1915 .. 6,713
Haputale	..	do .. Haldummulla .. March 19, 1915 .. 6,705
Idugashena	..	do .. do .. do ..
Kalupahane	..	Haputale .. May 4, 1917 .. 6,870
Kelburne	..	Koslanda .. December 28, 1917 .. 6,917
Koslanda	..	Monerakande .. do .. do ..
Laynastotte	..	Leanganwella .. Haputale .. March 19, 1915 .. 6,705
Leanganwella	..	do .. do .. do ..
Lyegrove (Lower)	..	do .. do .. do ..
Lyegrove (Upper)	..	Monorakande .. Koslanda .. February 5, 1915 .. 6,697
		.. March 19, 1915 .. 6,705

District.	Name of Estate or Division.	Group.	Post Town.	Date of Registration.	Gazette No.
Haputale—contd.	Lumugalla	Poonagalla	Bandarawela	February 5, 1915	6,697
	Macaldeniya	Meeribaddo	Koslanda	do.	do.
	Mahatande	do.	do.	May 14, 1915	6,713
	Malvika	Monerakande	do.	do.	do.
	Meriaedde	do.	do.	do.	do.
	Monarkande	do.	do.	March 19, 1915	6,705
	Nahskettia	Needwood	Haldummulla	May 14, 1915	6,713
	Needwood	do.	Koslanda	November 16, 1917	6,909
	Oakfield	do.	Haldummulla	March 19, 1915	6,705
	Oakwell	Poonagalla	Bandarawela	February 6, 1915	6,697
Maputale West	Sherwood	—	Hepatale	May 14, 1915	6,713
	Sima Golconda	—	do.	May 4, 1917	6,870
	Singarawatta	—	Koslanda	December 28, 1917	8,917
	Udahem	Poonagalla	Bandarawela	February 5, 1915	6,697
	Wiharegalla	—	Hepatale	do.	do.
	—	—	—	—	—
	Eastland	—	—	—	—
	Gonavy (see Hewaheta Lower district)	—	—	—	—
	Hengurankete (Lower)	Hanguranketie	Hangurankete	September 10, 1915	6,739
	Brahmingoda	—	Hewaheta	October 22, 1915	6,749
Hewaheta (Upper)	Rivertide	—	do.	February 5, 1916	6,697
	Butland	—	do.	do.	do.
	Bellwood	—	Galaha	December 11, 1914	6,687
	Bowana	—	Delkota	February 5, 1915	6,697
	Dobotte	—	Galaha	do.	do.
	Gallantenne	—	Looleondra	do.	do.
	Gonavy	—	Delkota	do.	do.
	Gongala	—	—	March 19, 1915	6,705

District.	Name of Estate or Division.	Group.	Post Town.	Date of Registration.	Gazette No.
Kadugannawa—contd.					
	Niyamakanda ..	—	Kadugannawa ..	July 5, 1918	6,954
	Orion (see Pussellawa).	—	Campola ..	February 5, 1915	6,997
	Batawella ..	—	Kadugannawa ..	January 12, 1917	6,847
	Silver Hill ..	—	do. ..	do.	6,847
	Sinuwipititia ..	—	do. ..	do.	do.
	Udopalata ..	—	do. ..	do.	do.
Kadugannawa, North or Alagala ..					
	Allagala ..	—	do. ..	March 19, 1915	6,705
	Ballongalla ..	—	do. ..	January 12, 1917	6,847
	Coodegalla Farm ..	—	do. ..	October 22, 1915	6,749
	Gerigama ..	—	do. ..	February 5, 1915	6,897
	Government Experiment Station ..	—	do. ..	August 31, 1917	6,895
	Kirimittia ..	—	Peradeniya ..	July 30, 1915	6,730
	Kituldeniya ..	—	Kadugannawa ..	February 5, 1915	6,897
	Kottekodde ..	—	Paradesiyas ..	December 11, 1914	6,887
	Kurugrama ..	—	do. ..	June 18, 1915	6,722
	Lankka ..	—	do. ..	do.	do.
	Angathena ..	—	Mawanella ..	June 1, 1917	6,876
	Samilia ..	—	do. ..	June 18, 1915	6,722
	Seastield ..	—	do. ..	July 30, 1915	6,730
	Tiamoda ..	Tismoda ..	Kadugannawa ..	March 19, 1915	6,705
	Yahalakenna (see Gisagedera), Arapolakande ..	—	do. ..	do.	do.
	Halwatura ..	—	Tebuwana ..	February 5, 1915	6,697
	Neuchâtel Rayigam ..	—	Ingrinya ..	May 4, 1917	6,870
	Ambikando ..	—	Neboda ..	February 5, 1915	6,897
	Debolawans ..	—	Padrikas ..	July 20, 1917	6,888
Kalutara ..			Aranyaka ..	February 5, 1915	6,697
	Arapolakande ..	—	do. ..	March 10, 1915	6,705
	Halwatura ..	—			
	Neuchâtel ..	—			
	Rayigam ..	—			
	Ambikando ..	—			
	Debolawans ..	—			
Kegalla ..					

Donoughmore	..	..	Aranayaka	..	February 5, 1915	..	6,697
Erie	..	..	Kegalla	..	do.	..	do.
Glenalmond	..	..	Aranayaka	..	do.	..	do.
Golinda	..	..	Kogala	..	March 19, 1915	..	6,705
Karandunona	..	..	do.	..	do.	..	do.
Kusaveneire (see Kelani Valley).	..	..	Aranayaka	..	February 5, 1915	..	6,697
Maryland	..	..	do.	..	do.	..	do.
Millegatunne	..	..	do.	..	do.	..	do.
Narangalla	..	..	do.	..	July 30, 1915	..	6,730
Paranbe	..	..	Undugoda	..	do.	..	do.
Pindeni-oya (see Kelani Valley).	..	..	Aranayaka	..	February 5, 1915	..	6,697
Fondappe	..	..	Undugoda	..	March 19, 1915	..	6,705
Udagoda	..	..	do.	..	February 5, 1915	..	6,697
Wahareka (see Kelani Valley).	..	..	..	..	..	..	..
Yakaderiya	..	..	..	..	..	..	..
Yellagowry (see Dolosbage).	..	..	..	..	..	..	..
Kelani Valley							
Abassi	..	..	Arikkawella	..	March 9, 1917	..	6,858
Ardross	..	..	Yatiyaitota	..	May 14, 1915	..	6,713
Atherfield	..	..	Arikkawella	..	do.	..	do.
Avington	..	..	Yatiyaitota	..	February 5, 1915	..	6,697
Arikkawella	..	..	Arikkawella	..	do.	..	do.
Bibliyatenne	..	..	Yatiyaitota	..	March 19, 1915	..	6,705
Bovline	..	..	Heningford	..	do.	..	do.
Broadlands	..	..	Rondura	..	Arikkawella	..	6,697
Chesterford	..	..	..	..	Watawala	..	6,705
Clara	..	..	..	..	Arikkawella	..	6,867
Clunes	..	..	..	..	do.	..	do.
Degalesa	..	..	..	..	Dehiowita	..	6,697
Dehiowita	..	..	..	..	Yatiyaitota	..	6,705
Don Pedro	..	..	..	..	Dehiowita	..	do.
Eiderapolla	..	..	..	..	do.	..	do.
Ella	..	..	Xogama	..	August 3, 1917	..	6,890
				..	May 14, 1915	..	6,713
				..	do.	..	do.

District.	Name of Estate or Division.	Group.	Post Town.	Date of Registration.	Gazette No.
Kelani Valley—contd.	El-Noor Eliston	Hemingford	Avissawella	March 19, 1915	6,705
Errachat	—	—	Puwakotiya	February 5, 1915	6,697
Fernby	—	—	Delioritta	May 14, 1915	6,713
Florence	—	—	Puwakotiya	February 5, 1915	6,697
Ganspalla	—	Rondura	Watwala	do.	do.
Glassel	—	—	Yatiyanota	May 14, 1915	6,713
Gongagamma	—	—	Delioritta	February 5, 1915	6,697
Halgolla	—	Halgolla	Kitinigala	do.	do.
Hatarangalla	Yogama	Yogama	Yatiyanota	August 3, 1917	6,890
Hemingford	Hemingford	Hemingford	Delioritta	March 19, 1915	6,705
Huketenne	Sepumalkande	—	Avissawella	do.	do.
Incurans	—	—	Yatiyanota	May 14, 1915	6,713
Kelami	—	—	Ruanwella	February 5, 1915	6,697
Kiuross	—	—	Yatiyanota	do.	do.
Kiripotuwa	—	—	Undugoda	March 19, 1915	6,705
Knavesmire	—	—	Yatiyanota	February 5, 1915	6,697
Lavant	—	—	do.	March 19, 1915	6,705
Mahirikanda	—	—	Delioritta	February 5, 1915	6,697
Mahidinya	—	—	Yatiyanota	do.	do.
Mipitiyakande	—	—	do.	May 14, 1915	6,713
Oaklands	—	—	do.	February 5, 1915	6,697
Panawatta	Parusella	Hemingford	Avissawella	October 22, 1916	6,749
Pashheriya	Perarith	Perarith	Puwakotiya	March 19, 1915	6,705
Pearith	—	—	Ruanwella	do.	do.
Piccadilly	—	—	Yatiyanota	do.	do.
Rindeen-oya	—	—	Watwala	February 5, 1915	6,697
Pungallia	—	—	Rondura	do.	do.

District.	Name of Estate or Division.	Group.	Post Town.	Date of Registration, No.
Knuckles—contd.				
	Maddakelle ..	Knuckles —	Madukelle ..	February 5, 1915 .. 6,697
	Moregahagalla ..	Knuckles ..	do. ..	March 19, 1915 .. 6,705
	St. John's Hill ..	Knuckles ..	do. ..	January 12, 1917 .. 6,847
	Tunisgalla ..	Tunisgalla ..	Rangala ..	July 30, 1915 .. 6,730
	Waragelanda ..	— ..	do. ..	February 5, 1915 .. 6,697
Kotmale				
	Acravatié ..	— ..	Kotmale ..	do. ..
	Atherion ..	— ..	Galboda ..	January 12, 1917 .. 6,847
	Borhill ..	— ..	do. ..	February 5, 1915 .. 6,697
	Dambagalla ..	— ..	Ulapane ..	do. ..
	Donside ..	— ..	do. ..	do. ..
	Doombagastalawa ..	— ..	Newalapitiya ..	do. ..
	Fettencairn ..	— ..	Kotmale ..	do. ..
	Gingeranoya ..	Kadienlena ..	do. ..	May 14, 1915 .. 6,713
	Goorookoya ..	Goorookoya ..	do. ..	February 5, 1915 .. 6,697
	Greenwood ..	— ..	do. ..	do. ..
	Hirangalla ..	Kotmale ..	Kotmale ..	do. ..
	Kadienlena ..	Kadienlena ..	do. ..	do. ..
	Katapola ..	— ..	do. ..	do. ..
	Kolapatana ..	— ..	do. ..	do. ..
	Mahasema ..	Kadienlena ..	do. ..	do. ..
	Qonogaloya ..	— ..	do. ..	do. ..
	Pitsligo ..	Kadienlena ..	do. ..	do. ..
	Ravensraig ..	— ..	Harangalla ..	June 18, 1915 .. 6,722
	Tellisgalla ..	— ..	do. ..	December 17, 1915 .. 6,764
	Tyspane ..	Tyspane ..	do. ..	September 10, 1915 .. 6,739
	Westhall ..	Westhall ..	— ..	— ..
Karunegala				
Kuruwita	..	.. (see Ratnapura district).	— ..	— ..

Madusilma and Hewadilya	Adawatta	..	..	Lunugala	..	May 14, 1916	..	6,713
	Ambangoda	..	..	do.	..	September 19, 1915	..	6,730
Cocawatte		..	..	May 14, 1915	..	6,713		
Deybrook		..	..	do.	..	June 1, 1917	..	6,976
Hopton		..	..	do.	..	September 10, 1915	..	6,739
Kohelwatte		..	..	do.	..	July 29, 1917	..	6,888
Kingsgoda		..	..	do.	..	May 14, 1916	..	6,713
Mahadova (Lower) Park		..	..	Modusilma	..	January 25, 1918	..	6,921
Roebury Shawlands		..	..	Lunugala	..	September 10, 1915	..	6,739
Swinton		..	..	Madusilma	..	June 29, 1917	..	6,584
Yapane		..	..	Lunugala	..	June 18, 1916	..	6,722
Maskellya		..	..	do.	..	September 10, 1915	..	6,739
Elfridale		..	..	do.	..	May 14, 1915	..	6,713
Forres		..	..	Watawala	..	February 6, 1916	..	6,697
Gallawattie		..	..	Maskellya	..	January 2, 1917	..	6,847
Hapugastenna		..	..	Watawala	..	February 6, 1916	..	6,697
Lammermoor		..	..	Maskellya	..	March 19, 1916	..	6,705
Lexapenskalla		..	..	Watawala	..	February 6, 1916	..	6,697
Rutherford		..	..	do.	..	do.	..	do.
Theberton		..	..	Maskellya	..	do.	..	do.
		..	..	Watawala	..	do.	..	do.
Matale East and Leggala	Ambena	..	..	Negalla	..	Gammaduwa	..	6,858
Banderapola		..	..	Banderapola	..	Matale	..	6,705
Cabrigalla		..	..	—	..	February 5, 1916	..	6,697
Cavataenne		..	..	—	..	March 19, 1915	..	6,705
Clodagh		..	..	Pitakanda	..	January 2, 1917	..	6,847
Dambulla		..	..	—	..	December 11, 1914	..	6,987
Dangkanda		..	..	—	..	March 19, 1916	..	6,705
Dooroomedella		..	..	Mouslande	..	Gammaduwa	..	do.
Dromoland		..	..	—	..	do.	..	6,697

Districts.	Name of Estate or Division.	Group.	Post Town.	Date of Registration.	Gazette No.
Matale East and Laggala - contd.	Elleralla Forest Hill	—	Rattota	March 19, 1915	6,705
	Ganbarepola	—	Gammaduwa	do.	do.
	Godapola	—	Matale	do.	do.
	Hattianwella	Bandarapola	do.	do.	do.
	Kandenewara	Bree	Madukelle	July 30, 1915	6,750
	Karigahatalawa	—	Matale	June 18, 1915	6,722
	Keregahatenne	Bandarapola	do.	March 19, 1915	6,705
	Kensington	—	Gammaduwa	February 6, 1915	6,897
	Kirara	—	do.	March 19, 1915	6,705
	Koladachy	Pitakanda	Matale	December 11, 1914	6,687
	Lauragalla	—	Ratibatha	March 9, 1917	6,955
	Longville	Brae	Madukelle	July 30, 1915	6,730
	Mansgalla	—	Ratibatha	June 7, 1918	6,948
	Midlands	Brae	do.	July 30, 1915	6,730
	Mousagalla	—	do.	do.	do.
	Muandandyawa	—	Matale	March 19, 1915	6,705
	Negalla	Banderapola	do.	do.	do.
	Nicholaya	—	Gammaduwa	March 9, 1917	6,858
	Opalgalla	Nicholaya	Ratibatha	February 5, 1915	6,697
	Owella	—	Gammaduwa	March 18, 1915	6,705
	Pitakande	Opalgalla	Matale	July 30, 1915	6,730
	Pitakande (see Kelliebokka district).	—	Gammaduwa	March 16, 1915	6,705
	Sudugama	Pitakanda	Matale	December 11, 1914	6,687
	Sylvakanda	—	do.	September 10, 1915	6,739
	Wewehamade	—	do.	December 11, 1914	6,687
	Wharegora	—	do.	June 18, 1915	6,722
	Karangalla	Nalande	do.	March 19, 1915	6,705
	Nelwade	—	do.	do.	do.